1.0 PURPOSE/ OBJECTIVE

The purpose of this cost estimate is to provide costs for the removal of vermiculite containing insulation (VCI) and associated asbestos-containing material (ACM), cleaning and restoration of the Second Hand Store in Libby, Montana. The costs include the work for removal of ACM and VCI, including containment, storage, transportation and disposal of generated contaminated materials, decontamination facility, restoration of the affected walls and floor, and final site breakdown .

The Second Hand Store is a 2-story, wood frame retail store, consisting of a first floor, approximately 80 ft by 65 ft (5,200 SF), and an unfinished attic with exposed flooring. The store contains inventory throughout the first floor and attic. The approximate area of VCI in the building is 1,480 SF. This includes a portion of the attic floor and 3 interior walls. The VCI has also leaked into the first floor of the store through cracks in building materials. In addition, the soil surrounding the building and underneath the crawl space is also believed to be contaminated with asbestos-contaminated material.

2.0 PROCEDURE

The work for this project was split into 9 line items, each detailed in a cost worksheet, labeled CW2-1 through CW2-9. The work items were broken down as follows:

- CW2-1 ACM Personal Protective Equipment (PPE)
- CW2-2 Decontamination Facility
- CW2-3 Building Containment and Set-up
- CW2-4 Inventory Cleaning
- CW2-5 VCI Bulk Removal
- CW2-6 Detail Building Cleaning, Encapsulation and Restoration
- CW2-7 Asbestos-Contaminated Soil Removal
- CW2-8 Transportation and Disposal
- CW2-9 Site Breakdown

The cost worksheets were then summarized in a Cost Summary, CS-3. Cost worksheets and summary are attached.

3.0 DATA/REFERENCES

Information for the details of The Second Hand Store building, including size and type of building, were obtained from the Supplemental Interior Inspection Checklist (SIIC) and field visits. A copy of The Second Hand Store SIIC is attached for reference.

Costs for each item in the cost estimate were obtained from one or more of the following sources: published MEANS and ECHOS cost books, local vendor quotes, and previous work performed by CDM Federal.

Several cost adjustments were made based on the following factors:

H&S Productivity (labor and equipment only) – Some field work will be performed in Level C PPE. A productivity factor (HPF) of 0.55 is applied to labor and equipment unit costs derived directly from published sources. No factor is applied when health and safety impacts have been considered in the estimation of task durations.

Escalation to Base Year – When costs are taken from earlier dated cost sources, adjustments are made to reflect the current cost in 2003. 2001 cost sources are escalated by 3% to 2003 costs (EF=1.03). 2000 cost sources are escalated by 4% to 2003 costs (EF=1.04). 1998 cost sources are escalated by 9% to 2003 costs (EF=1.09). 1996 cost sources are escalated by 17% to 2003 costs (EF=1.17).

Area Cost Factor - An AF of 1.13 is used for Montana, except an AF of 1.00 (national unmodified average) is used for local vendor quotes.

Subcontractor Overhead and Profit - It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.

Prime Contractor Overhead and Profit - It is assumed that home office OH is 5%, and field office OH is 10%. Profit of 8% is used for the Prime Contractor.

Many of these factors were obtained from "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000 and the Engineering News-Record website relating to building cost indexes (http://end.construction.com/featureds/conEco/costIndexes/default.asp).

4.0 ASSUMPTIONS/ LIMITATIONS

The following assumptions were made for the basis of this cost estimate:

- The following durations will be used for each of the listed tasks:
  - Building Containment and Set-up – 2.5 days
  - Inventory Cleaning and Removal– 7 days
  - Removal of VCI bulk material - 5 days
  - Detail cleaning and encapusulation - 2 days
  - Wall restoration – 2 days
  - Exterior ACM soil removal, backfill and compaction – 1day
  - ACM soil removal from crawl space – 2 days
  - Site Breakdown – 2.5 days

  Therefore, the total duration for this project will be 22 days.
- A crew of one labor foreman, 4 laborers and 1 vacuum truck driver will be on site for the duration of the work. A site manager will also be on site part time.
- Personal Protective Equipment (PPE) for the duration of the removal of VCI and ACM material will include respirators, disposable coveralls, gloves, foot covering, and protective eye wear.
- Decontamination area will be provided for the decontamination of employees, materials, and their equipment.
- Area warning signs and warning tapes will be provided at the regulated boundaries and entrances to regulated areas. Disposal warning labels will be attached to each asbestos disposal container removed from the abatement area.
- The entire building will serve as the containment area. All openings will be sealed and negative air pressure provided (air lock, 60-mil polyethylene over all windows, doors, wall openings, electrical outlets, etc, use duct tape to provide airtight seal). HEPA-filter vacuum cleaner and a HEPA-filter ventilation system will be provided in the work area.
- The material and inventory inside the entire building will be vacuumed and wet wiped, as necessary.
- This inventory will be boxed into storage boxes after being cleaned and brought back into the store once the remediation is complete.
- VCI will be removed from the 20' by 40' attic floor and 3 interior walls. Soil contaminated with ACM will also be removed along the perimeter of the building and beneath the crawl space.

- Removal of the VCI will include removing the interior wall and vacuuming material directly into vacuum boxes, each holding 25 CY. The VCI in the attic floor is exposed; therefore, no finished floor will have to be removed prior to vacuuming. The vacuum boxes will be transported to an asbestos landfill for proper disposal.
- Vacuum boxes are currently mobilized on site for the Libby Asbestos Project. It is assumed that these boxes will be used for this property as well.
- Once VCI bulk material is removed, the exposed walls and floor will be cleaned using an HEPA vacuum and fine brush. All flooring on the first floor will be vacuumed and wet wiped, as necessary.
- An encapsulant will be sprayed onto the exposed area, followed by the installation of new insulation.
- The wall will be placed back into it's original position.
- The assumed dimensions of the contaminated soil material are 10 feet wide by 6 inches deep along the north, east and west perimeters of the building and 6" deep underneath the crawl space (approximate SF of building). This material will be loosened, vacuumed into the vacuum boxes, and disposed of at the asbestos landfill. The area will then be backfilled and compacted with clean soil.
- Finally, construction material and equipment will be removed from the site.

These assumptions are based on the process currently being performed at other locations at the Libby Asbestos Project for removal of VCI and ACM. This cost estimate is an approximation and is based on approximated building dimensions and remediation durations.

5.0 CALCULATION

This section contains the calculations and assumptions for each line item in the cost estimate.

5.1 ACM Personal Protective Equipment (CW2-1)

It is assumed that the workers in containment area (4 laborers, 1 vacuum truck driver) will need 2 sets of Level C PPE per day for the duration of the VCI bulk removal, detail cleaning and asbestos contaminated soil removal.

PPE needed = 5 people x 2 sets x 15 days = 150 each

In addition, the workers plus the foreman and site manager will need 2-way radios = 7 radios

5.2 Portable Decontamination Facility (CW2-2)

This line item includes set-up and removal fee for a portable decontamination facility for decontamination of employees, materials and equipment for the duration of the project. It is assumed an outside contractor will set-up and remove the facility. Decontamination material is to be disposed of with all other contaminated material.

5.3 Building Containment and Set-up (CW2-3)

Containment and set-up on site is assumed to take 2.5 days. Labor for this line item includes the following:

Laborer hours = 2.5 days x 8 hours/day x 4 laborers = **80 hours**

Foreman hours = 2.5 days x 8 hours/day x 1 foreman = **20 hours**

Site manager hours = 2.5 days x 4 hours/day x 1 foreman = **10 hours**

The entire building area will be used as containment. Doors, windows, vents, etc. will be sealed off using polyethylene sheeting. It is assumed that the store has approximately 3 doors and 15 windows that will need to be sealed.

Quantity of polyethylene needed=

	Width, ft	Height, ft	Area, SF
3 doors	2	7	42
15 windows	4	4	240
Total			282
Add 10 % safety factor (to account for vents, etc)			
			310

Based on similar work for the Libby Asbestos Project, it is assumed that **10 negative air units** will be needed in order to provide adequate pressure for containment.

5.4 Inventory Cleaning (CW2-4)

Store inventory will be vacuumed and wiped down, as necessary, before being boxed into storage boxes/trailers. Upon completion of remediation, the inventory will be brought back into the shop. Assumptions for this work include:

- 4 storage boxes (16' x 8') will be adequate for storing all inventory.
- Total duration for this task will be 7 days
- In addition to the 4 laborers, 1 foreman and 1 site manager, 2 extra laborers will be added for this task.
- Quantity, in square feet, of inventory to be cleaned is assumed to equal the square footage of the building

Labor time:

Laborer hours = 7 days x 8 hours/day x 6 laborers = **336 hours**

Foreman hours = 7 days x 8 hours/day x 1 foreman = **56 hours**

Site manager hours = 7 days x 4 hours/day x 1 foreman = **28 hours**

Square footage of first floor:

	Width, ft	Length, ft	Area, SF
Storage	18	20	360
	14	8	112
	14	8	112
	14	12	168
Stairs to attic area	14	12	168
Fire wood storage	10	10	100
Open Area	36	20	720
	25.5	30	765
Bathroom	10	10	100
Approx. desk area and entrance	30	20	600
Additions	35	5	175
	40	5	200
	40	10	400
	80	15	1200
			5,180

5.5 VCI Bulk Removal (CW2-5)

The 4 laborers, 1 foreman, and 1 vacuum truck and driver will be on-site for the duration of the VCI bulk removal, 5 days. The site manager will be on site part time.

Laborer hours for VCI removal = 5 days x 8 hours/day x 4 laborers = **160 hours**

Foreman hours for VCI removal = 5 days x 8 hours/day x 1 foreman = **40 hours**

Vacuum Truck and driver time = 5 days * 8 hours/day = **40 hours**
(cost includes time for driver and truck)

Site manager hours for VCI removal = 5 days x 4 hours/day x 1 foreman = **20 hours**

5.6 Detail Cleaning, Encapsulation and Wall Restoration (CW2-6)

Exposed walls and affected attic floor will be fine brushed and vacuumed once VCI bulk material is removed. Rough carpentry exposed walls will not need wet wiping. All flooring on the first floor will be vacuumed and wet wiped, as necessary. The entire attic floor is exposed; therefore, it will not need to be vacuumed or wet wiped.

Square footage of the VCI contaminated walls and attic floor:

	Width, ft	Height, ft	Area, SF
Attic floor	20	40	800
Walls	19	8	152
	60	8	480
	6	8	48
Total			1480
Add 10% safety factor			**1,628**

Area for vacuum and fine brush = **1,628 SF**

Area for vacuum and wet wipe= square footage of first floor = **5,180 SF** (see calculation above)

Encapsulant will be applied on all exposed walls and the affected attic floor.

Area of Encapulant = **1,628 SF**

New insulation will then be installed in walls and attic floor.

Area of Insulation = **1,628 SF**

It is assumed that all existing walls will be restored once encapsulation and insulation installation has been completed.

The labor for this task will include the 4 laborers and 1 foreman full-time and 1 site manager half-time for the duration of cleaning, encapsulation and wall renovation.

2 days (cleaning and application of encapsulant) +2 days (wall renovation) =**4 days.**
(site manager = **2 days**)

The vacuum truck and driver will be needed on site for detail cleaning only (assume **2 days**).

5.7 Asbestos-Contaminated Soil Removal (CW2-7)

Asbestos-containing soil has been visually seen in the soil along the exterior perimeter of the building and in the crawl space. The assumed dimensions for soil removal are approximately 10' wide by 6" deep along the north, west and east perimeter of the building. The south side is paved and will be vacuumed for surficial material. It is known that the basement crawl space has flooded in the past and serves as a drainage area for the railroad track and the city of Libby. Therefore, the entire area of the crawl space is assumed to be contaminated 6" deep.

N, E, and W perimeter of building = 80 + 75 + 84 = 239 LF

Detail: ACM Removal and Restoration Cost Estimate

Volume of soil removed:

Along perimeter of building

Perimeter, ft	Width, ft	Depth, ft	Volume, CF	Volume, BCY
239	10	0.5	1195	44

Underneath crawl space

Area, SF	Depth, ft			
5,180	0.5		2590	96
		Total:		**140**

The soil will be loosened and then vacuumed into the vacuum boxes, similar to the VCI removal. Once the soil is removed, the area will be backfilled and compacted with clean soil.

Total labor hours for exterior soil removal, backfill and compaction will include the 4 laborers and 1 foreman for 1 day (site manger for ½ day). The vacuum truck and truck driver will also be needed for 1 day.

Total labor hours for crawl space soil removal, backfill and compaction will include the 4 laborers and 1 foreman for 2 days (site manger for 1 day). The vacuum truck and truck driver will also be needed for 2 days.

5.8 Transportation and Disposal (CW2-8)

This line item includes the transportation and disposal costs for each vacuum box to the asbestos landfill. The number of vacuum boxes is calculated by first calculating the volume of material being transported to the landfill, including VCI material, ACM soil, miscellaneous ACM material and decontamination material. It is assumed that the VCI is approximately ½' thick.

Asbestos landfill disposal volumes

	Thickness, ft.	Area, SF	Volume, CF	Volume, CY
VCI material	0.5	1,628	814	30
Asbestos-contaminated soil				140
Total				170
Add 10% for misc.:				**187**

It is assumed that the vacuum boxes that are already mobilized on site for other properties at the Libby Asbestos Project will be used. Therefore, there will be no cost for the vacuum boxes themselves. The number of vacuum boxes will need to be calculated for disposal. Current disposal rates are $200 per vacuum box.

The quantity of boxes will be based on the total volume of asbestos contaminated material. Each vacuum box can hold 25 CY of material.

Vacuum boxes for disposal = 187 CY / 25CY = **7 boxes**

5.9 Site Breakdown (CW2-9)

This line item includes the cost for 4 laborers and 1 foreman for 2.5 days to clean and break-down site and equipment. Also included is the cost for the site manager for half-time (1.25 days).

6.0 CONCLUSIONS

The cost worksheet summary, CS-3, lists each of the above line items and associated costs, for a total capital cost of $83,518. This cost includes decontamination, PPE, containment system, inventory cleaning, VCI bulk removal, building cleaning and restoration, asbestos-contaminated soil removal, transportation and disposal of contaminated material, and final site breakdown. Again, this cost estimate is an approximation based on approximate dimensions and remediation durations.